Aerospace Engineering Thesis Defense

Shape optimization of pin fins in heat sinks using Genetic Algorithm

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Abstract

This research aims to identify optimal pin fin shapes that minimize flow pressure drop and maximize heat transfer performance under varying heat loads. It also seeks to investigate the influence of computational fluid dynamics (CFD) parameters. The overarching goal is to discover innovative pin fin configurations using a genetic algorithm, deviating from conventional circular cylindrical designs. Additionally, the study examines the impact of heat transfer boundary conditions and CFD parameters on the outcomes of the genetic algorithm. Overall, in terms of energy efficiency, semiconductor-based cooling systems can operate with significantly lower power consumption, thereby reducing energy consumption and lowering operating costs.

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